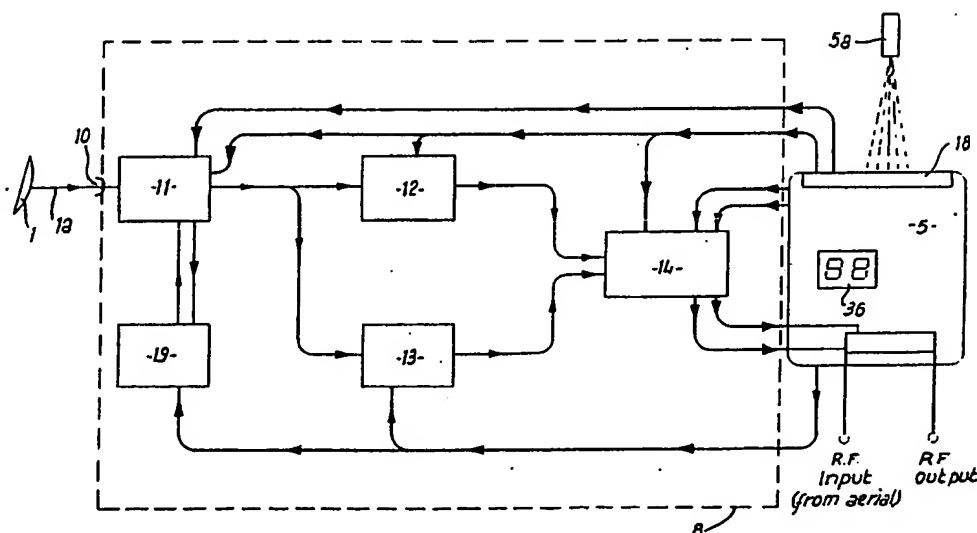




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(54) Title: TUNING APPARATUS**(57) Abstract**

A video tuner capable of changing TV channels directly in conjunction with a TV set and/or capable of changing satellite channels with may be received from a satellite antenna (1). The device overcomes the problem that in the past a separate tuner has been required to change the signal/polarity of a carrier signal from a satellite antenna and a further tuner (7) and remote control (7a) have been required to change TV channels. The device in a preferred embodiment is in the form of a plug-in chip or dedicated circuit, also overcomes a problem of having large amounts of wiring when there are more than one satellite receiver. Power supplies taken from an internal bus within a conventional receiver and control signals are provided from an existing micro-processor (18).

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TUNING APPARATUS

This invention relates to tuning apparatus and more specifically, but not exclusively, to tuning apparatus for use with television (T.V.) and/or a video recorder (V.R.).

5 The growth in satellite communications has given rise to a variety of new television channels. These channels are transmitted from satellites. In order to maximise the bandwidth available for broadcasting, so as to optimise satellites' broadcasting capabilities, signals are transmitted not only at different frequencies, but also in different
10 polarisation modes. Subscribers to various satellite channels must be in possession, of amongst other things, a tuner to select the channel as desired. This may result in the subscriber having to have several tuners, if for example, he subscribes to view more than one channel.

A satellite dish receives microwave energy and converts it to a
15 more manageable frequency typically in the range of 950 - 1725 MHz. The tuner, together with a polarity selector, has been incorporated in a device known as the receiver. It is the receiver which receives the microwave converted signal from the satellite dish and further reduces its frequency to a UHF signal. This signal is known as the baseband
20 signal.

A problem with receivers has been that they have basic electrical components in common with a T.V. or a V.R. If there is more than one receiver, they may each have components in common with one another. Not only does such a duplication of components give rise to
25 an increase in costs, but also it can result in interference between either the receiver and the V.R. and/or the T.V. or between individual

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receivers.

Another problem when a viewer has more than one tuner, and therefore more than one receiver, is that each receiver is accompanied with its own remote controller which must be employed each time it is
5 desired to view a different channel. Because of this, receivers for subscriber T.V. channels, whether or not they are satellite channels, are unnecessarily expensive. A further problem is that if a subscriber has several such receivers, there may be large amounts of wiring, which together with the number of receivers, may be unsightly and
10 even dangerous.

It is an object of the present invention to provide an improved video tuning apparatus.

According to the present invention video tuning apparatus comprises a tuner and video equipment having tuning circuitry, characterised in
15 that the tuner receives a tuning control signal from the tuning circuitry.

Preferably the control signal is a variable voltage signal which may be already available from an existing microprocessor in the V.R. The V.R. may be pre-programmed with a selection of channels, and the corresponding voltage representative of the frequency and/or polarity
20 of the data signals carrying these channels, so that each channel may be selected from a single remote controller.

Preferably the tuner is selectively switched so that the baseband signal, that is the signal which carries the desired channel to be viewed, is displayed directly onto a T.V. screen or is recorded directly
25 onto a video recording medium. This may be achieved by adapting the remote controller for the V.R., thereby removing the need for a separate

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controller for the receiver and V.R.

Preferably the tuner is in a form such that it may be mounted directly into the cabinet of a V.R., this may be as a single integrated circuit. The apparatus may be in the form of a plug or a permanent
5 hard wire device, in either case a low voltage power supply, directly available from a bus within the V.R. is preferably provided to power the receiver.

Preferably the invention is inserted in series with the existing audio and vision output lines of the video recorder. Switching means
10 is provided which is linked to the microprocessor so as to switch, as required, either the receiver "into circuit" if it is desired to view a satellite channel; or to switch the normal output of the video recorder "into circuit", if it is desired to playback a recorded programme or view a non-satellite channel.

15 One embodiment of the invention will now be described by way of example only, and with reference to the following figures in which:

Figure 1 illustrates a diagrammatical view of the prior art;

Figure 2 illustrates a block diagram of Figure 1;

Figure 3 illustrates a diagrammatical view of a T.V. and V.T.R.

20 with a satellite channel reception facility; and

Figure 4 illustrates a block diagram of the invention of figure 3.

Referring to figure 1 a satellite dish 1 is mounted together with a conventional T.V. aerial 2 on the roof 3 of a house 4. Inside the house there is a video tape recorder (V.T.R.) 5 which is linked via
25 coaxial cable 6 to a television set 7. The satellite dish 1 and the conventional aerial 2 are connected to the V.T.R. via coaxial cables 1a

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and 2a respectively. This is because the microwave signals are converted to lower frequency signals at the satellite dish, by microwave converter, 30. The V.T.R. 5, T.V. 7 and receiver 8 all have remote control facilities 5a, 7a and 8a respectively. The receiver 8, shown in detail in figure 2, receives high frequency signals from the satellite dish, and tunes the desired channel as described below.

Figure 2 shows how the receiver in figure 1, of which there may be several, operates. The arrowed lines indicate the power supply for each stage of the receiver. Remote controller 5 shines a coded infra-red beam to detector 60. The detector 60 converts the pulsed infra-red light to an electronic signal which is sent to microprocessor 70. The microprocessor 70 then determines by way of a look-up table (not shown) the frequency of the signal of the chosen channel and the respective polarity of the signal. Microprocessor 70 then sends control signals in parallel along lines L1 and L2 to a tuning voltage generator 80 and a polarity control 90 respectively. In addition to this a control signal is sent to a channel display 36, which may be a liquid crystal display. The tuning voltage generator 80 outputs the D.C. tuning signal to the tuning demodulator 100. This D.C. signal is in the range of between 0 and 20 volts. The tuning demodulator 100 will then tune to the frequency corresponding to the D.C. input voltage thereby selecting the desired channel and outputting the correct baseband signal on the line L3. This signal is supplied to a vision amplifier 110 and an audio filter 120 simultaneously. The amplified vision signal and filtered audio signal are then output from the receiver 8, shown in dotted lines to modulator and tuning circuitry of the video tape recorder

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(V.T.R.). This signal is then further processed by the V.T.R. where it is either recorded on the recording medium or directly output via the R.F. output line to a T.V. set.

Figure 3 illustrates a similar arrangement as illustrated in figure 1 with the same reference numerals being used throughout. However the V.T.R. 5 has been modified by including the invention 8 as depicted in detail in figure 4. Figure 4 illustrates a block diagram of the satellite receiver 8, which is shown in figure 3 as being inside the cabinet of the V.T.R. 5. Line 1a from the satellite dish is connected to input 10 of the tuner demodulator 11. The signal passes along the coaxial cable 1a to the tuner demodulator 11 where its frequency is lowered to a baseband signal and output to a visual signal amplifier 12 and audio filter 13. The amplified visual signal and filtered audio signal are then applied to visual and audio switching circuit 14. The switched output signal is then, according to whether it is desired to watch the programme on television or to record the programme using the V.T.R., output to the respective output port as separate audio and visual signals.

When it is desired to change channels, that is to say from one satellite channel to another satellite channel, from a satellite channel to a "terrestrial channel" (that is channels from "earth" based transmitters) or from a "terrestrial channel" to a satellite channel, the remote handset 5a is used in conjunction with the detector mounted in the V.T.R. The selected channel has a predetermined code which pulses the infra-red beam. This code is detected by an infra-red detector and is then decoded by microprocessor 18. The microprocessor of the V.T.R.

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determines if the new channel is either "terrestrial" or "satellite", if the channel is satellite it then provides a variable output voltage from between 0 to 20 volts to the tuner demodulator. As well as this the microprocessor may provide a separate control signal to the polarity controller 19. The channel is in effect changed by the variable tuning voltage being altered by the microprocessor 18 and the tuning parameters of the tuning demodulator being altered accordingly. The arrangement thereby enables the tuner to tune into a variety of satellite T.V. channels on demand from a single remote controller. If the channel is "terrestrial" the satellite receiving circuitry is switched "out of circuit and the UHF signal, as received by the conventional TV aerial, is diverted to the tuning circuitry.

The controller of course may be used to pre-select terrestrial channels in the usual way as well as being able to select satellite channels. The limitation as to the number of channels being imposed solely by the ability of the remote controller 5 to code the channel number and the microprocessor to recognise the code.

Although reference has been made to a video tape recorder it will be appreciated that the recording medium may be in the form of a video disc or any other video recording medium.

In addition to the above the microprocessor 18 may also display the channel number on a liquid crystal display so as to enable the viewer to see to which channel he is tuned.

It is of course to be understood that the invention is not intended to be restricted to the details of the above embodiment which is described by way of example only.

CLAIMS

1. Video tuning apparatus comprising a tuner and video equipment having tuning circuitry, characterised in that the tuner receives a tuning control signal from the tuning circuitry.
2. Video tuning apparatus according to claim 1 wherein the control signal is a variable voltage signal.
3. Video tuning apparatus according to claim 2 wherein the variable voltage signal is available from a micro-processor in the video equipment.
4. Video tuning apparatus according to any preceding claim wherein the video equipment is a video tape recorder.
5. Video tuning apparatus according to any of claims 1 to 4 wherein the control signal, which is operative to vary the voltage signal, may be derived from a memory store of pre-programmed channels such that each voltage corresponds to a frequency and/or polarity of a data signal carrying a channel.
6. Video tuning apparatus according to claim 5 wherein a tuner may be switched to receive a base band signal.

7. Video tuning apparatus according to claim 6 which is controlled by a remote control monitor.

8. Video tuning apparatus according to claim 7 controlled by a remote control monitor which also controls T.V. and/or video.

9. Video tuning apparatus according to any preceding claim which may be incorporated into an intergrated circuit.

10. Video tuning apparatus according to claim 9 which may be in the form of a plug or permanent wire device.

11. Video tuning apparatus substantially as herein described with reference to the Figures.

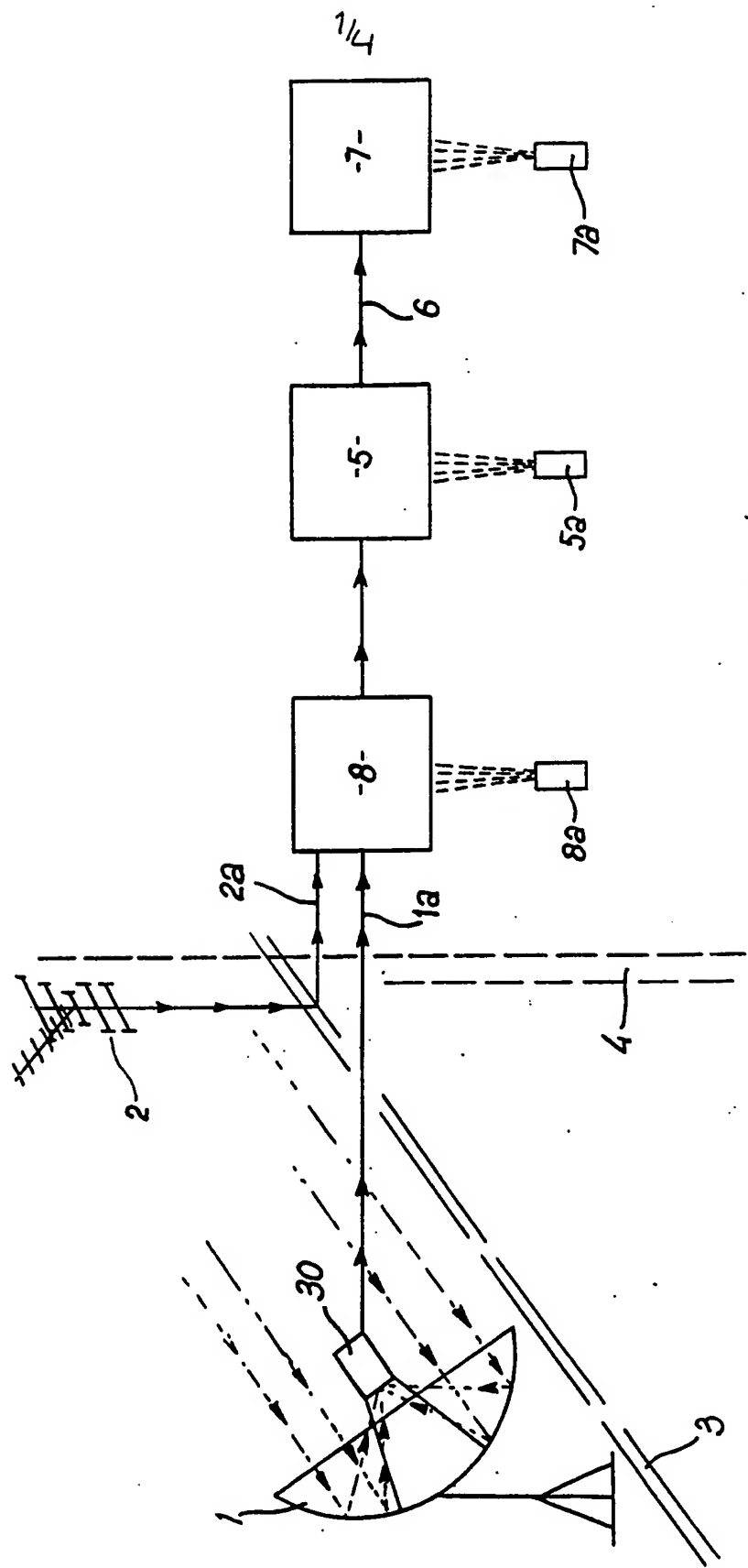
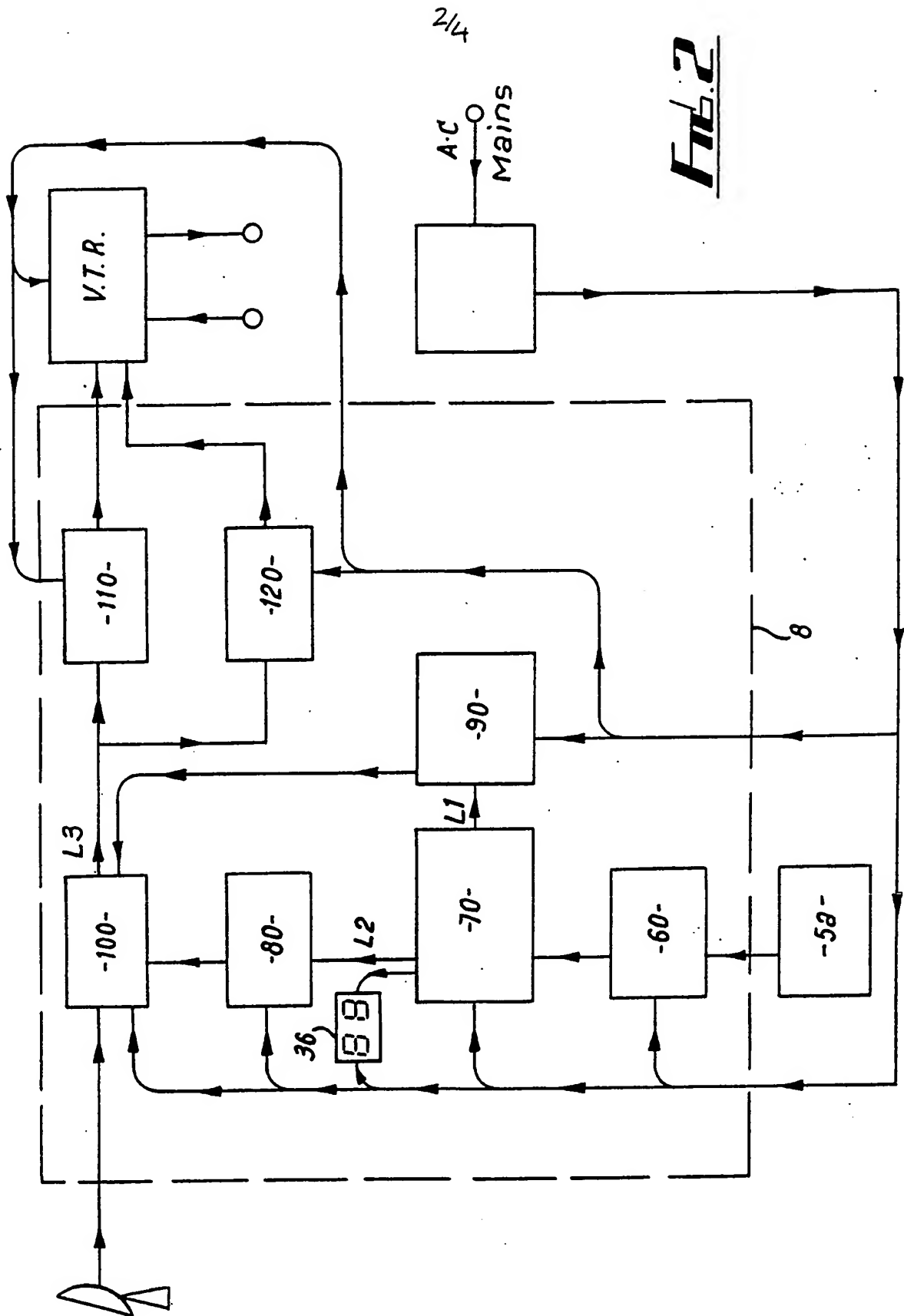


Fig. 1



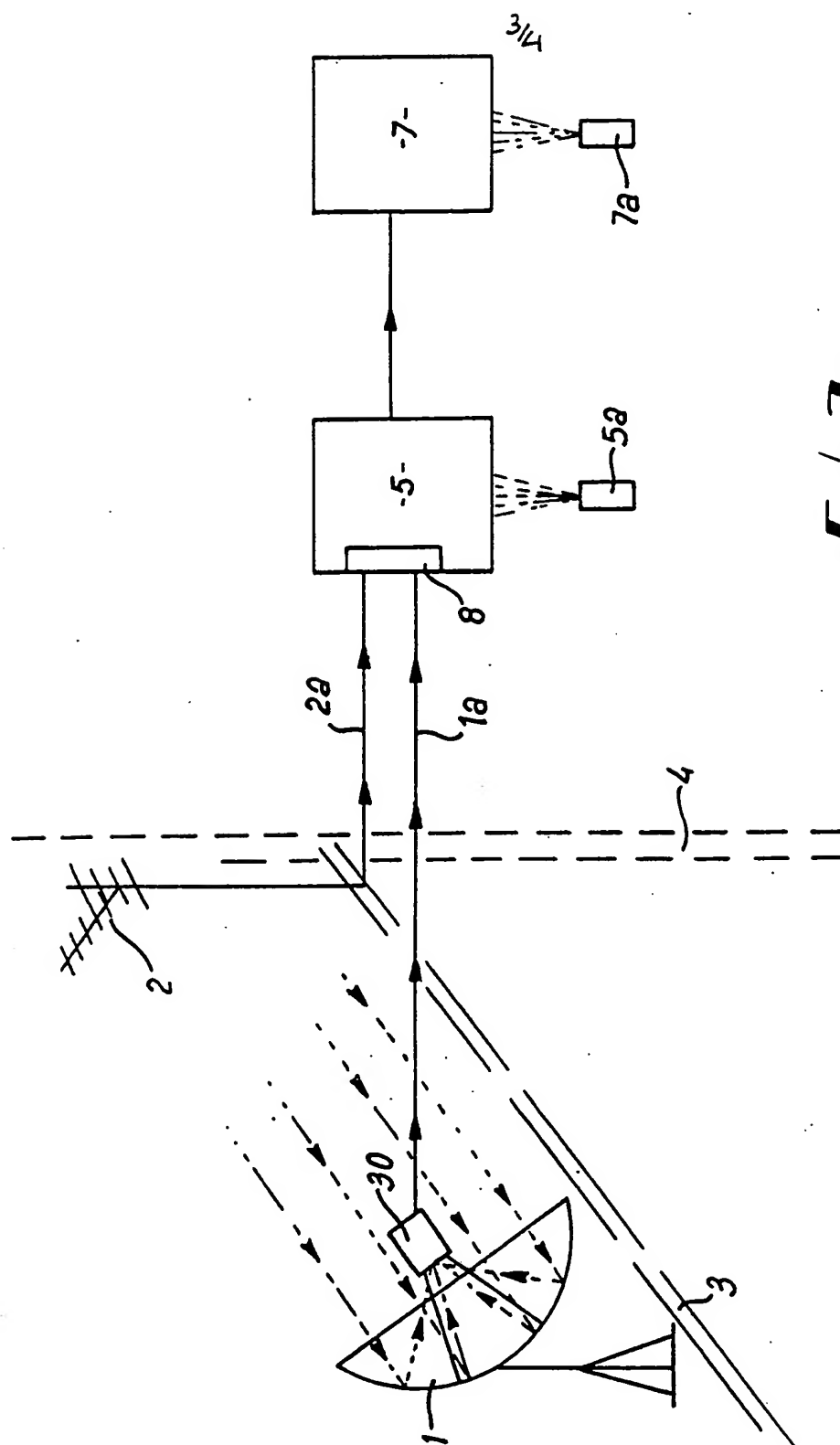


Fig. 3

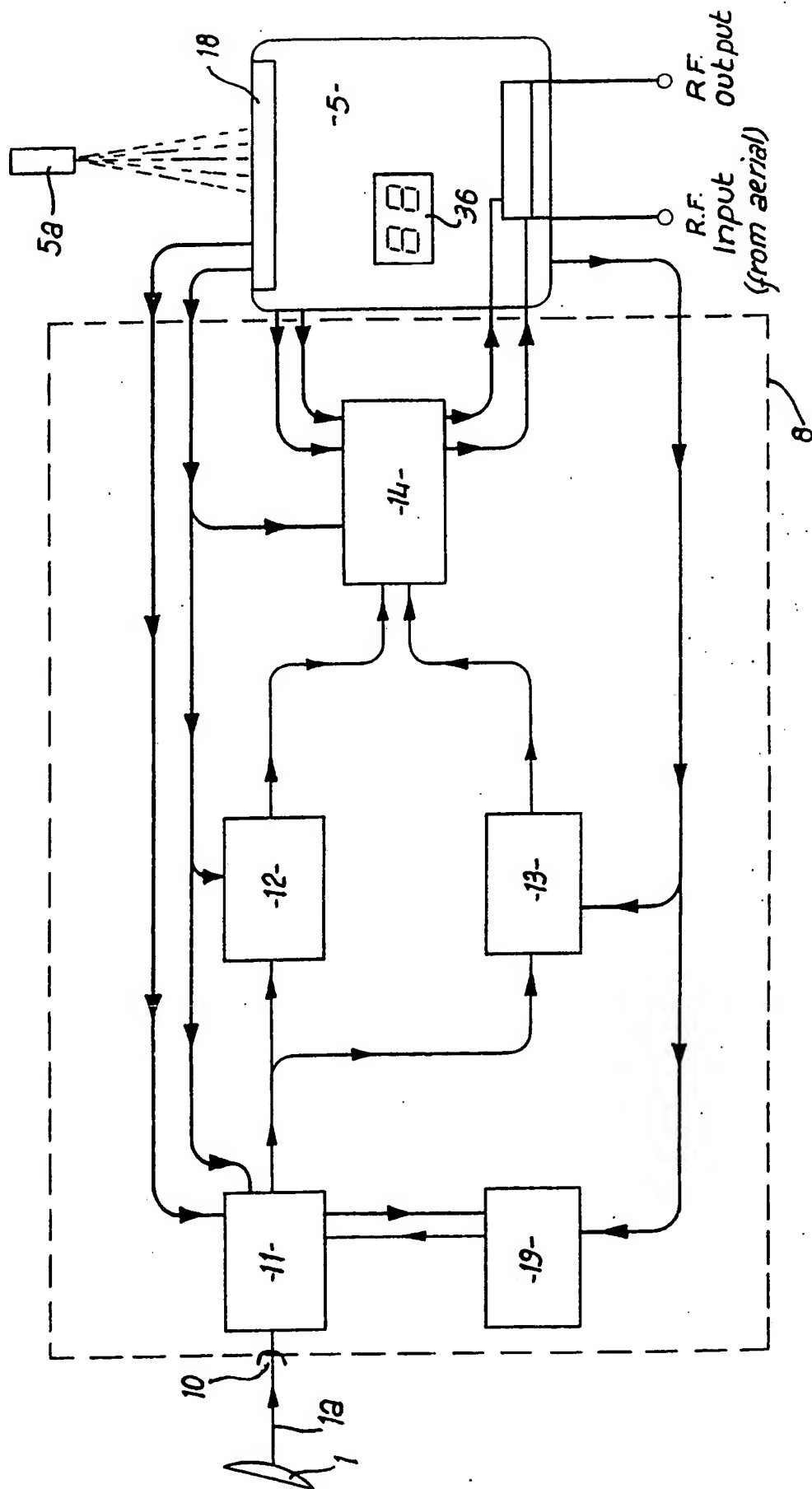
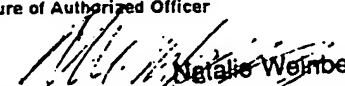
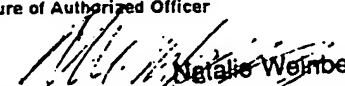
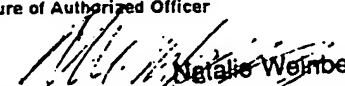


Fig. 4

INTERNATIONAL SEARCH REPORT

International Application No PCT/GB 90/01853

I. CLASSIFICATION OF SUBJECT MATTER (If several classification symbols apply, indicate all) ⁶ According to International Patent Classification (IPC) or to both National Classification and IPC IPC5: H 04 N 5/50, H 03 J 9/00														
II. FIELDS SEARCHED <div style="text-align: center;">Minimum Documentation Searched⁷</div> <table style="width: 100%; border: none;"> <tr> <td style="width: 25%; border: none;">Classification System</td> <td style="border: none;">Classification Symbols</td> </tr> <tr> <td style="border: 1px solid black; padding: 5px;">IPC5</td> <td style="border: 1px solid black; padding: 5px;">H 03 J, H 04 N</td> </tr> </table> <div style="text-align: center; padding-top: 5px;">Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in Fields Searched⁸</div>			Classification System	Classification Symbols	IPC5	H 03 J, H 04 N								
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IPC5	H 03 J, H 04 N													
III. DOCUMENTS CONSIDERED TO BE RELEVANT⁹ <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 10%;">Category *</th> <th style="width: 60%;">Citation of Document,¹¹ with indication, where appropriate, of the relevant passages¹²</th> <th style="width: 30%;">Relevant to Claim No.¹³</th> </tr> </thead> <tbody> <tr> <td style="text-align: center; vertical-align: top;">X</td> <td>EP, A2, 0285869 (BRIONVEGA) 12 October 1988, see column 3, line 10 - column 7, line 5; figure 1 <div style="text-align: center;">--</div></td> <td style="text-align: center; vertical-align: top;">1-11</td> </tr> <tr> <td style="text-align: center; vertical-align: top;">X</td> <td>US, A, 4843482 (HEGENDÖRFER) 27 June 1989, see column 2, line 4 - line 50; figure 2 <div style="text-align: center;">--</div></td> <td style="text-align: center; vertical-align: top;">1-11</td> </tr> <tr> <td style="text-align: center; vertical-align: top;">X</td> <td>US, A, 4667243 (BLATTER ET AL) 19 May 1987, see column 4, line 33 - line 41; figure 1 <div style="text-align: center;">--</div></td> <td style="text-align: center; vertical-align: top;">1-11</td> </tr> </tbody> </table>			Category *	Citation of Document, ¹¹ with indication, where appropriate, of the relevant passages ¹²	Relevant to Claim No. ¹³	X	EP, A2, 0285869 (BRIONVEGA) 12 October 1988, see column 3, line 10 - column 7, line 5; figure 1 <div style="text-align: center;">--</div>	1-11	X	US, A, 4843482 (HEGENDÖRFER) 27 June 1989, see column 2, line 4 - line 50; figure 2 <div style="text-align: center;">--</div>	1-11	X	US, A, 4667243 (BLATTER ET AL) 19 May 1987, see column 4, line 33 - line 41; figure 1 <div style="text-align: center;">--</div>	1-11
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<div style="display: flex; justify-content: space-between;"> <div style="width: 48%;"> <p>* Special categories of cited documents: ¹⁰</p> <p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier document but published on or after the international filing date</p> <p>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p> </div> <div style="width: 48%;"> <p>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>"X" document of particular relevance, the claimed invention cannot be considered novel or cannot be considered to involve an inventive step</p> <p>"Y" document of particular relevance, the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.</p> <p>"Z" document member of the same patent family</p> </div> </div>														
IV. CERTIFICATION <table style="width: 100%; border: none;"> <tr> <td style="width: 50%; border: none;">Date of the Actual Completion of the International Search</td> <td style="width: 50%; border: none;">Date of Mailing of this International Search Report</td> </tr> <tr> <td style="border: 1px solid black; padding: 5px;">26th February 1991</td> <td style="border: 1px solid black; padding: 5px; text-align: center;">19. 03. 91</td> </tr> <tr> <td style="border: none;">International Searching Authority</td> <td style="border: none;">Signature of Authorized Officer</td> </tr> <tr> <td style="border: 1px solid black; padding: 5px; text-align: center;">EUROPEAN PATENT OFFICE</td> <td style="border: 1px solid black; padding: 5px; text-align: center;">  Natalie Weinberg </td> </tr> </table>			Date of the Actual Completion of the International Search	Date of Mailing of this International Search Report	26th February 1991	19. 03. 91	International Searching Authority	Signature of Authorized Officer	EUROPEAN PATENT OFFICE	 Natalie Weinberg				
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III. DOCUMENTS CONSIDERED TO BE RELEVANT (CONTINUED FROM THE SECOND SHEET)		
Category *	Citation of Document, with indication, where appropriate, of the relevant passages	Relevant to Claim No
P,X	DE, A1, 3831994 (DEUTSCHE THOMSON-BRANDT) . 29 March 1990, see abstract; figure 1 -- -----	1-11